



**USAID**  
FROM THE AMERICAN PEOPLE

**Hydropower Investment  
Promotion Project (HIPP)**

# **MARKET COUPLING AT THE GEORGIAN-TURKISH BORDER**

MAY 15, 2013

This publication was produced for review by the United States Agency for International Development. It was prepared by Deloitte Consulting.

# **MARKET COUPLING AT THE GEORGIAN-TURKISH BORDER**

MAY 15, 2013

USAID HYDROPOWER INVESTMENT PROMOTION PROJECT  
(HIPP)

CONTRACT NUMBER: EEM-I-00-07-00005-0

DELOITTE CONSULTING LLP

USAID/CAUCASUS OFFICE OF ENERGY AND ENVIRONMENT

## **DISCLAIMER:**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

# TABLE OF CONTENTS

1.0	GLOSSARY OF ABBREVIATIONS.....	1
2.0	INTRODUCTION.....	2
3.0	AUCTION TYPES .....	2
4.0	IMPLICIT AUCTION ADVANTAGES.....	3
5.0	MARKET COUPLING BASIC PRINCIPLES.....	4
6.0	MARKET COUPLING EXPERIENCE IN EUROPE .....	6
7.0	MECHANICS OF MARKET COUPLING.....	10
8.0	ALTERNATIVE APPROACHES ABSENT A DAY-AHEAD MARKET	10
9.0	TURKISH MARKET ACTIVITIES'.....	11
10.0	MARKET COUPLING CONSIDERATIONS.....	13
11.0	RECOMMENDED STEPS.....	17

## **1.0 GLOSSARY OF ABBREVIATIONS**

ATC	Available Transmission Capacity
CBETA	Cross-Border Electricity Trade Agreement
EEC	European Energy Community
ESCO	Electricity System Commercial Operator
ETM	Electricity Trading Mechanism
IOA	Interconnection Operation Agreement
MO	Market Operator
NTC	Net Transmission Capacity
PMUM	Piyasa Mali Uzlastirma Merkezi, market operator in Turkey
TEIAS	Turkiye Elektrik Iletim Anonim Sirketi, transmission company and transmission system operator
TSO	Transmission System Operator

## **2.0 INTRODUCTION**

The Akhaltsikhe-Borchka interconnection with Turkey is nearing completion and the Batumi-Muraltı interconnection is in the planning stages. The purpose of these interconnections is two-fold: to facilitate cross-border flows of electricity between Georgia and Turkey (with potential further transit to Europe), and to provide access to higher priced markets to encourage the development of renewable resources (particularly hydroelectric projects) in Georgia.

Given that capacity availability across the interconnection is limited (initially 700 MW Net Transmission Capacity (“NTC”) and then increasing over time), there is a need to allocate this capacity among potential users (“congestion management”). The governments of Georgia and Turkey have determined, through a Cross Border Electricity Trade Agreement (“CBETA”) and an Interconnection Operation Agreement (“IOA”), that an auction process will be used to allocate interconnection capacity over and above amounts that will be reserved for certain renewable energy projects.

In accordance with the CBETA, the entities to which ATC will be allocated are decided by the exporting country. Further, in accordance with the IOA, electricity export directions are determined annually for each month of the following calendar year and ATC volumes for relevant periods are allocated by the exporting country.

This paper addresses types of auctions for allocating transmission capacity. The recommended auction process, implicit auctions, is not feasible at this time because such auctions require day-ahead markets in both countries. Georgia does not yet have a day-ahead market in place. As a result, a companion paper “Transition Process For Day-Ahead Transactions Between Georgia and Turkey” describes a potential path toward implicit auctions.

## **3.0 AUCTION TYPES**

There are two relevant forms of auction for allocating interconnection capacity: explicit auctions and implicit auctions. An explicit auction is one in which an Available Transmission Capacity (“ATC”) is determined jointly by the Transmission System Operators (“TSO”) in Georgia and Turkey and interconnection capacity rights are offered to bidders. Bidders submit price offers for the ATC and when bid volume exceeds ATC, a clearing price is established by ranking price offers in descending order and determining the price at which accepted bid volume equals ATC. Energy transactions are handled separately from explicit auctions.

An implicit auction integrates interconnection capacity allocation into the energy markets as a combined energy and transmission capacity bid. An implicit auction is the means of achieving “market coupling” which links separate markets recognizing cross-border interconnection capacity constraints. The intent is to optimize interconnection capacity usage and maximize economic efficiency. Implicit auctions are typically used for day-ahead markets and explicit auctions for other time frames.

## 4.0 IMPLICIT AUCTION ADVANTAGES<sup>1</sup>

The advantages of market coupling through implicit auctions are:

- Removes unnecessary risks of trading short-term transmission capacity and energy separately;
- Guarantees the optimal utilization of transmission capacity with transmission capacity allocated according to the price difference in the two energy markets;
- Enables netting of the flows in the opposite direction;
- Reflects congestion cost as the price difference between the two energy markets;
- Less prone to market abuse since capacity cannot be hoarded;
- Market participants benefit from optimal cross-border capacity usage;
- Encourages liquid, robust spot markets.

A drawback to explicit auctions is that two separate transactions result in exporters facing an unclear decision of whether transmission capacity should be purchased first and then the energy should be sold second, or if the energy should be sold first and then the transmission capacity should be purchased second. Failure to obtain both the transmission capacity and energy sale either leaves an exporter with transmission capacity it cannot use or an energy sale obligation for which it does not have transmission capacity rights.

For the purpose of this paper, we will rely on the conclusions of numerous findings by European regulators that have determined that an implicit auction is the preferable process<sup>2</sup> for allocating interconnection capacity for day-ahead markets. While we will not attempt to provide an independent analysis of the benefits of implicit auctions, the conclusions reached are consistent with a common sense idea that overall market efficiency can be maximized when taking both energy markets and transmission constraints into account in an integrated fashion rather than dealing with the two functions separately.

- European Commission DG for competition Energy sector inquiry, January 2007

“Although explicit auctioning is theoretically and with perfect foresight an efficient mechanism and it is in practice compatible with Regulation 1228/2003, it has efficiency deficits compared to implicit auctioning especially where intraday and balancing markets are illiquid. With implicit auctions results of trade are less likely to have economically irrational use of the interconnector capacity”

---

<sup>1</sup> APX-ENDEX Market Coupling and BritNed seminar December 8, 2009 (“APX Market Coupling Seminar”)

<sup>2</sup> “Why Introducing Implicit Auctions in the Central South Region?” GME presentation April 21, 2008

- European Commission DG Energy and Transport, Report on Regulation 1228/2003 on cross border trade in electricity, May 2007

“In the future, more capacity will be allocated through implicit auctions. The so-called market coupling method developed by ETSO and the association of European Power Exchanges (EuroPex) has, at the moment, the highest potential of truly integrating the European electricity market through implicit auctions at the day-ahead stage.”

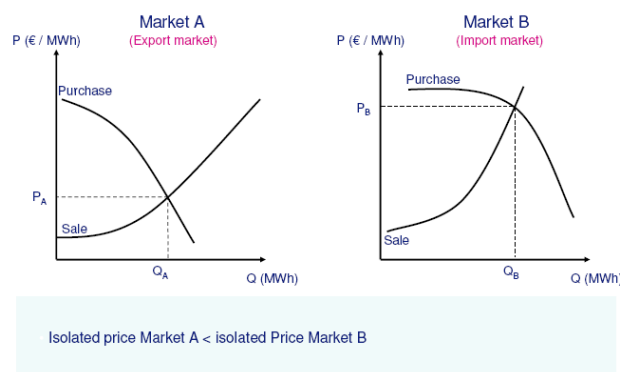
- European Regulators Group for Electricity and Gas Coherence and Convergence Report, July 2007:

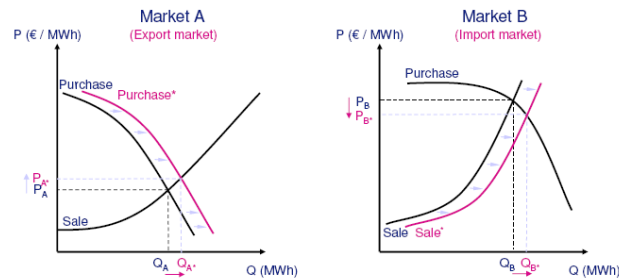
“It is now widely recognized that for the day-ahead timeframe, implicit allocation methods are more efficient than explicit auctions and should be the target mechanism for all regions for the day-ahead timeframe”

## 5.0 MARKET COUPLING BASIC PRINCIPLES

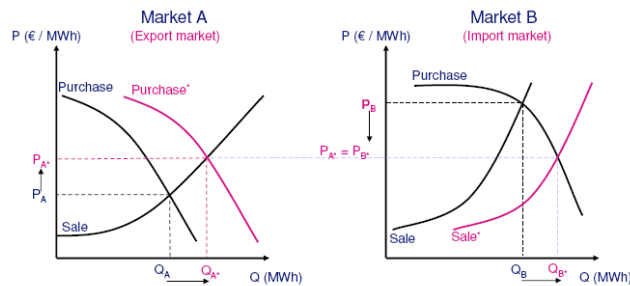
The basic principles of market coupling are illustrated in three charts from the “APX Market Coupling Seminar”.

- The first chart shows the Sale (or supply) and Purchase (or demand) curves for two isolated markets.
- The second chart shows the same market curves, but (a) shifts the Purchase curve on the lower price (export) market to show the additional export volumes that would be dispatched in that market and (b) shifts the Sale curve on the higher price (import) market to show the additional import volumes. The clearing price in the export market increases and the clearing price in the import market decreases as a result of the implicit auction. The clearing prices in both markets are different, implying that the export/import volumes are constrained by interconnection capacity limits.
- The third chart is similar to the second, except that the export/import volume is not constrained by interconnection capacity limits. This leads to the clearing price in the two markets being equal to each other.





- Isolated price Market A < isolated Price Market B
- Market A can export to market B (purchase- and sale curve shift)



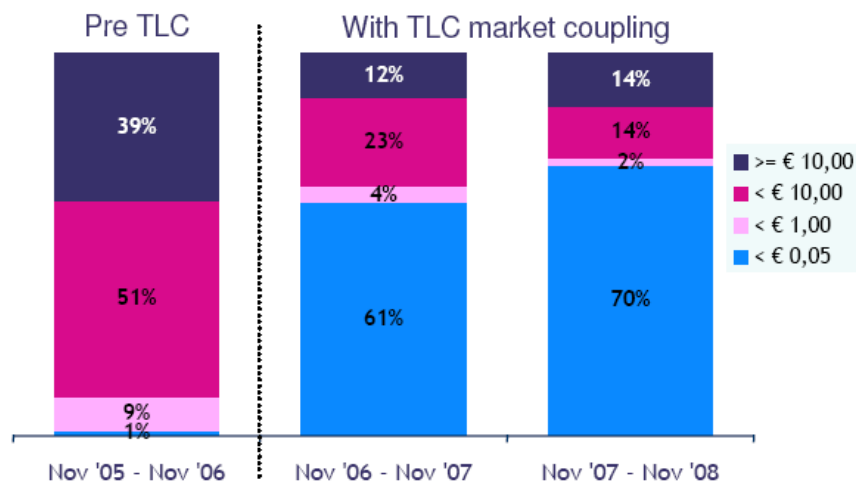
- Isolated price Market A < isolated Price Market B
- Market A can export to market B (purchase- and sale curve shift)
- Prices market A and B converge till price market A = price market B

From a combined market efficiency perspective, the charts illustrate that the additional exports from the lower cost market offset higher cost supply in the higher cost market. Further, the charts illustrate that transmission constraints ( $Q_A$  to  $Q_{A^*}$  in the export market and  $Q_B$  to  $Q_{B^*}$  in the import market) can be integrated into the respective supply/demand curves of the markets, resulting in a coupling of both markets.

The APX Market Coupling Seminar includes a chart on price convergence with market coupling on the Netherlands-France interconnection as well as a chart on the inefficiency of explicit auctions. The results are striking. The first shows that there was price convergence between the two markets of less than 1 Euro 10% of the time before price coupling, increasing to about 60%-70% of the time after market coupling.

### Price convergence Netherlands – France

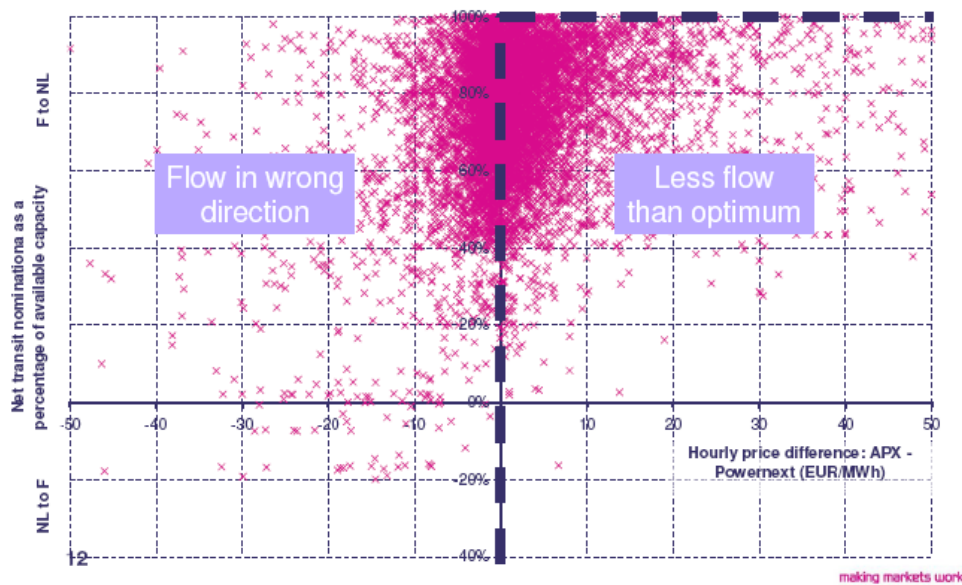
Hourly price difference, €/MWh





The second chart shows high levels of flows in the wrong direction and less than optimum flows in explicit auctions.

## Inefficiency of explicit auctions



## 6.0 MARKET COUPLING EXPERIENCE IN EUROPE

### BritNed<sup>3,4</sup>

We highlight the BritNed interconnection in this paper because it involves an HVDC link. BritNed is a joint venture between National Grid and TenneT to own and operate two bundled HVDC cables under the North Sea between the Netherlands and the United Kingdom. The BritNed Interconnector is 260 km in length and transmits 1,000 MW nominal power between transmission networks in the two countries. It was funded and operated independently from National Grid's and TenneT's regulated businesses. The interconnection began operation in April, 2011. It is of interest as it is a country to country HVDC link as with the Georgia-Turkey interconnection.

BritNed offers interconnection capacity in multiple timeframes. Explicit auctions are held for annual, quarterly, monthly, multiple days, and intraday. BritNed developed its own auction platform for the explicit auctions. Implicit auctions are held for day-ahead capacity.

While the focus of this paper is market coupling and implicit auctions, it is useful to consider the interaction with explicit auctions. The BritNed web site contains a link to medium term explicit auction results that is instructional in terms of the number of auctions held and volumes. <https://kingdom.unicorn.eu/Cfrmset.asp>. It

<sup>3</sup> BritNed presentation BritNed – Europe's link for the future

<sup>4</sup> [britned.com](http://britned.com)

is clear that BritNed is employing numerous auctions in both directions to maximize flow on the interconnection. The table below shows the publicly available information on each auction result.

Auction Detail	
Auction ID	NLGB-A-20120101-01399
Border Direction	NL-GB
Auction Name	NL to GB 2012 Calendar Annual Auction 1
Price Curve	<a href="#">Display Price Curve</a>

Medium-term Auction Statistics	
Offered Capacity [MW]	150
Total Requested Capacity [MW]	1,169
Total Allocated Capacity [MW]	150
Auction Clearing Price [EUR/MWh]	4.86
Number of Auction Participants	13
Number of Successful Participants	5
Number of Auction Bids	86

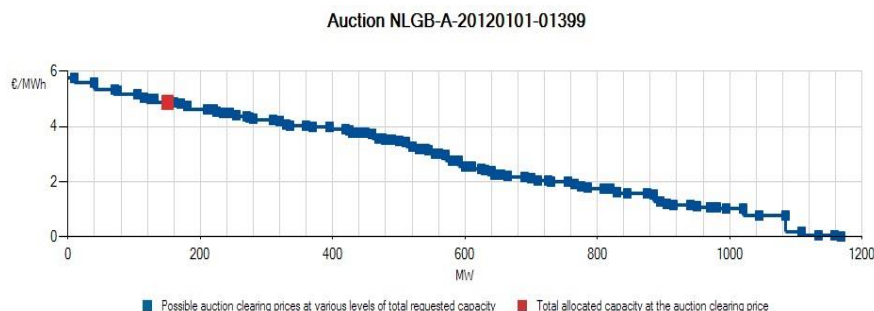
List of Capacity Holders	
Auction Participant Name	Auction Participant EIC
Barclays Bank	11XBARCAP-----7
Statkraft	11XSTATKRAFT001N
Gazprom MT	11XGAZPROM-MT--Y
Vattenfall	11XVE-TRADING--X

Only those Traders are shown who have enabled publishing of their results.

Reserve Price		
Capacity From [MW]	Capacity To [MW]	Reserve Price [EUR]
0	125	2.00
126	150	3.00

A bid curve (corresponding sample below) is also provided for each auction.



While BritNed developed its own auction platform for explicit auctions, it contracted APX to administer implicit auctions. The publicly available information on the APX website includes a brochure and a weekly report.

[http://www.apxgroup.com/wp-content/uploads/ProductSheets\\_APX\\_Power\\_UK.pdf](http://www.apxgroup.com/wp-content/uploads/ProductSheets_APX_Power_UK.pdf)

A portion of the brochure is included below:

“Since April 2011, the GB electricity market has been linked to the wider central West European electricity market through the BritNed, 1,000 MW interconnector, between the UK and the Netherlands. APX-ENDEX is the designated exchange, chosen by BritNed, to operate a daily implicit auction on their behalf. This integrates

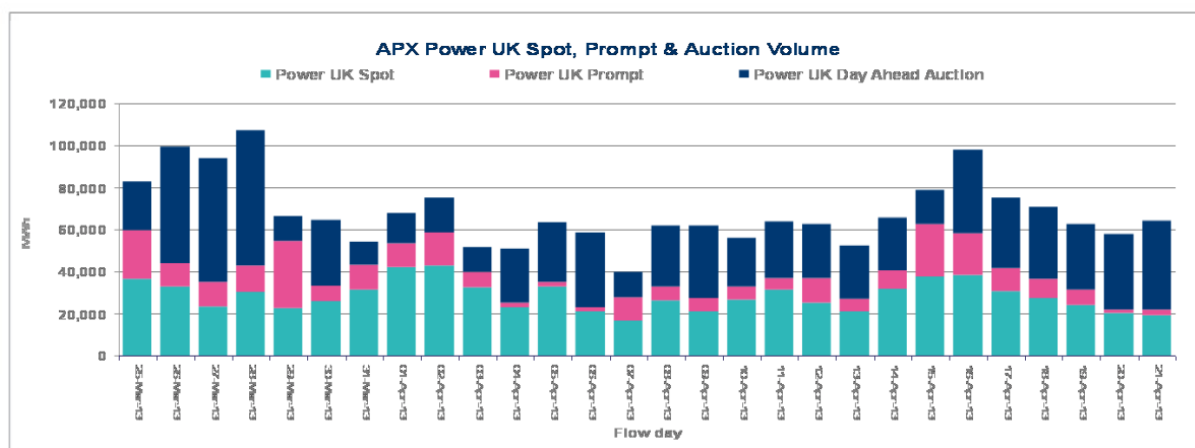
the Great Britain electricity market with the integrated Central Western European and Nordic electricity market, creating one of the largest integrated markets in the world. The implicit auctions run on both sides of the cable and the link to the wider European market has resulted in increasing volumes on the Power UK day-ahead auction, providing tangible benefits to the market such as the establishment of a reliable reference price and improved liquidity.”

The weekly report shows several charts of interest.

<http://www.apxgroup.com/wp-content/uploads/Week-17.pdf>

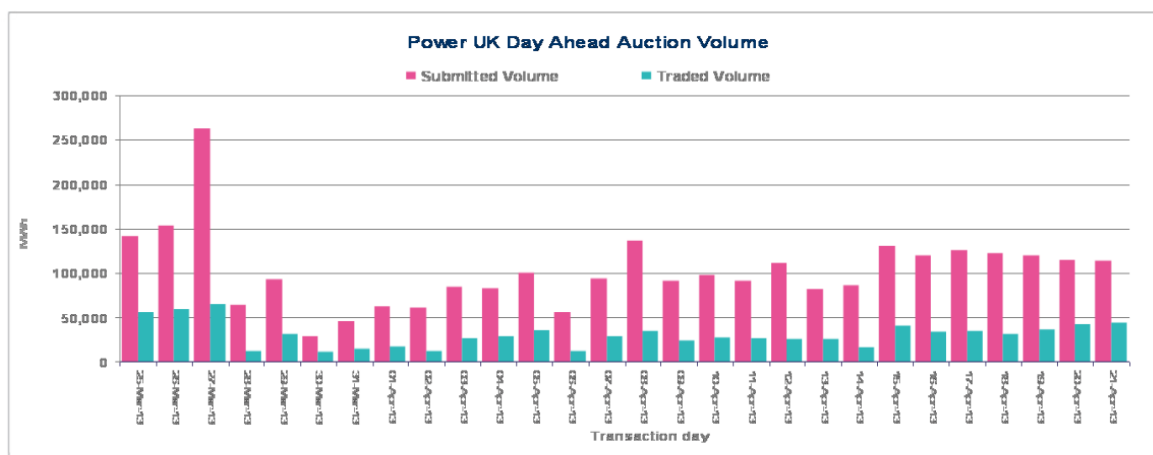
The first chart shows exchange traded volume by delivery day. This is a good illustration of the relative volume of the day-ahead auction as compared to the prompt (month ahead) and spot markets.

Exchange Traded Volume by Delivery Day

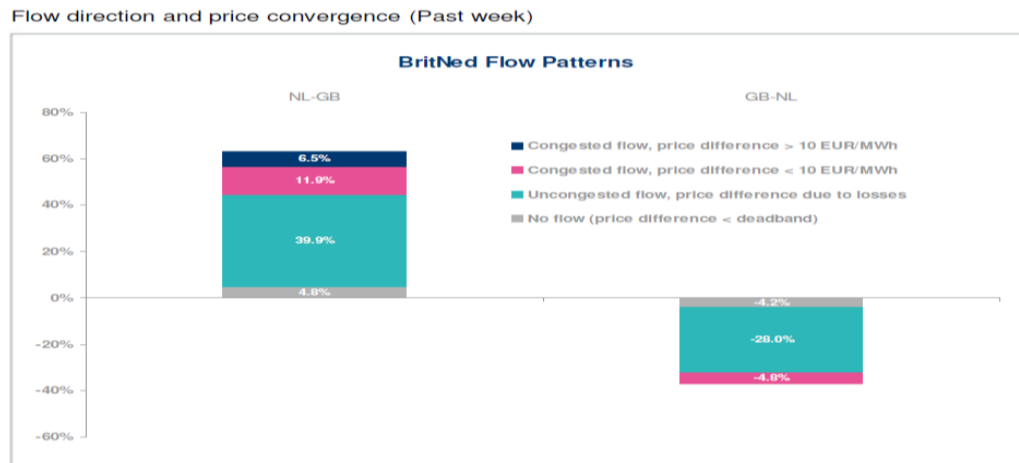


The second chart shows submitted volume as compared to traded volume. The submitted volumes are well in excess of the traded volume, showing strong interest in the capacity.

Orders and Contracts by Transaction Day



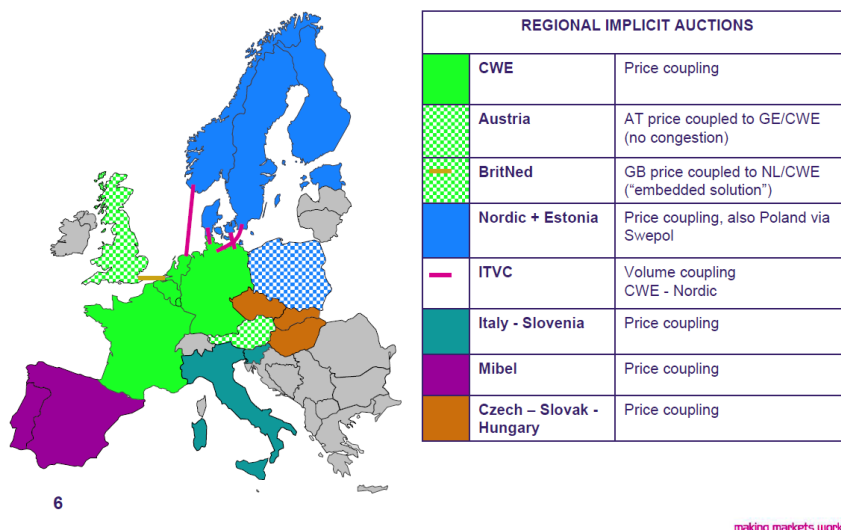
The third chart shows the degree of price conversion between the two markets.



### Other European Countries

This paper not address market coupling in other European markets except to point out that the concept is spreading rapidly throughout the region. The chart below<sup>5</sup> illustrates the current status of day-ahead market coupling. It is clearly becoming the standard way of doing business in Europe.

### Current Status – Day Ahead



<sup>5</sup> APX ENDEX presentation "Market Coupling in Europe – Towards One Internal Electricity Market" October 18, 2012

## **7.0 MECHANICS OF MARKET COUPLING<sup>6</sup>**

While there are several approaches for the administration of market coupling, the Italy – Slovenia approach is an example where each market operator/PX operates independently (using a common matching algorithm to ensure consistent results) and shares data about bids/offers in order to define import/export volumes.

Each market operator/PX is responsible for:

- Receiving bids/offers from its own market participants
- Running its own software, taking into account the bids/offers received from the other PX
- Determining and publishing market results

The market operators/PXs are jointly responsible for:

- Sharing data about bids/offers (in anonymous form) and ATC
- Adopting a common matching algorithm
- Checking data consistency (prices/volumes of imports/exports)
- Defining import/export volumes resulting from the market coupling

## **8.0 ALTERNATIVE APPROACHES ABSENT A DAY-AHEAD MARKET**

Since a day-ahead market does not yet exist in Georgia, it is not feasible to implement implicit auctions at this time. A companion paper “Transition Process For Day-Ahead Transactions Between Georgia and Turkey” describes a potential path toward implicit auctions. It describes:

- Bilateral energy contracting between Georgian exporters/importers and Turkish importers/exporters for day-ahead transactions. Parties would obtain interconnection capacity rights through a separate explicit auction process.
- Establishment of a “bulletin board” where market participants submit prices at which they are willing to buy/sell electricity at the border. This is a refinement to bilateral contracting as it makes prices more visible to buyers and sellers and encourages a more liquid market.
- Establishment of a special purpose power exchange whose activity is to solicit bids/offers for transactions at the border, clear those transactions (up to ATC for the day), and act as a clearinghouse for settlement. This is a move toward implicit markets because cleared transactions would receive interconnection capacity rights.
- Implicit auctions when a day-ahead market is in place in Georgia.

---

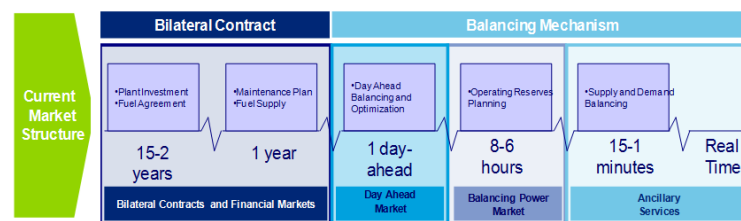
<sup>6</sup> GME presentation Market Coupling between Italy and Slovenia GME Rome 2 December 2010

## 9.0 TURKISH MARKET ACTIVITIES<sup>7,8</sup>

The Turkish market is made up of a combination of bilateral power purchase contracts and a balancing mechanism. Currently, the bilateral contracts represent roughly 70% of total energy sales with the remainder is sold through the day-ahead market and real time spot market. The balancing mechanism includes a day-ahead market and real time balancing in balancing power market. An ancillary services market is also in place for real time system security and reliability.

The balancing market operation began in 2006 and has evolved under amended market rules with the later addition of the day-ahead market. The chart below provides an overview of the market structure.

**Current market structure is composed of two main parts, namely bilateral contracts market accompanied by the balancing mechanism**



- Regarding the bilateral contracts, there are three typical existing structures:

- PPAs with 15-20 years
- vesting/transition contracts 2-5 years among EUAS, TETAS and TEDAS (DisCos)
- freely negotiated contracts.

- Current balancing mechanism comprises the market place where day ahead and real time load is balanced in day ahead market and balancing power market, respectively.
- Hourly settlement is done, and additionally collateral mechanism is in operation since December 1, 2011.

### Day-Ahead Market

The day-ahead market is the key market for the purpose of this paper. This is the market in which implicit auctions and market coupling would occur.<sup>9</sup>

<sup>7</sup> USAID HIPP Project **Turkish Electricity Market Review Project Report 1**

<sup>8</sup> Turkish Electricity Market Review November 2012 Deloitte Turkey

<sup>9</sup> Intraday market coupling is being introduced in some European markets but the initial phase is day-ahead market coupling.

The timeline for the Turkish day-ahead market procedures is shown below.

Day Ahead Market - Overview



The timeline is important because market coupling through implicit auctions involves the simultaneous evaluation of bids and offers in Georgia and Turkey. Therefore the timeline in both countries would have to be consistent with the requirements of the implicit auction. One time saving feature of implicit auctions is that there is not a need for an explicit transmission capacity auction that is separate from the energy auction since implicit auctions address energy and capacity optimization in the same process.

The day-ahead price determination process is executed daily for each hour in the following day. The price determination is the process of matching the hourly purchase bids and sale offers.

The market price is calculated in two stages; and unconstrained clearing price and then a clearing price with constraints taken into consideration. The clearing price calculation involves forming a supply curve by combining all price/volume supply offers in increasing order and forming a demand curve by combining all price/volume purchase bids in decreasing order. The clearing price is determined at the intersection of the demand and supply curves for every hour.

As envisioned, suppliers in the Turkish market will contract with exporters in Georgia that have obtained interconnection capacity rights in an explicit auction. These Turkish suppliers can offer that energy into the Turkish market (or alternatively can transact through a bilateral power purchase agreement in Turkey).

The conceptual change for implicit auctions in the day-ahead market is that the bid and offer curves in both the Turkish and Georgian markets are evaluated jointly to see if there are opportunities to export from the lower price market into the higher priced market, subject to the constraints on the interconnection. The volumes available for export/import in the implicit auction take into account any previously committed interconnection capacity rights (obtained contractually or through longer term explicit auctions).

The illustrative supply and demand curves for isolated markets and the impact of market coupling are shown in the basic principles section of this paper.

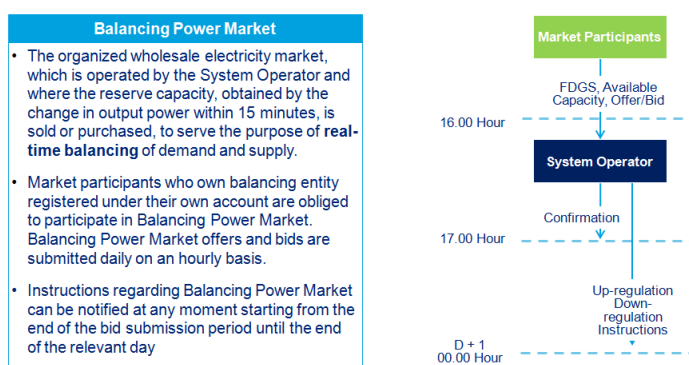


## Balancing and Settlement

Market participants registered as balancing entities are obliged to participate in the balancing power market. Balancing power market offers and bids are submitted daily for each hour. Reserve capacity, obtained by the change in output power within 15 minutes, is sold or purchased for real-time balancing of demand and supply.

The transition from day-ahead planning to a day-ahead market took place in December 2011 together with the collateral and advance payments mechanisms. At present balancing power market is being operated by Piyasa Mali Uzlastirma Merkezi ("PMUM"), a subsidiary of TEIAS. Under proposed legislation under review by parliament, PMUM will soon become Enerji Piyasaları İşletme Anonim Şirketi (EPIAS) and completely unbundled from TEIAS.

### Balancing Power Market - Overview



23

© 2012 Deloitte Turkey. Member of Deloitte Touche Tohmatsu Limited

## 10.0 MARKET COUPLING CONSIDERATIONS

As noted, market coupling through implicit auctions is not feasible as there is no day-ahead market in Georgia at this time. Additionally, there are a number of additional items that would require consideration when evaluating the prospects for future market coupling. These are addressed in this section.

### Conceptual Agreement on Interconnection Flexibility

An important conceptual topic as a precursor for market coupling is the degree to which the Georgian TSO and TEIAS agree on how much flexibility there is to change the MW loading and direction of flows on the interconnection. Additionally, agreement is needed on the concept of simultaneous contractual import and export transactions (with the physical flow being the net of those import and export transactions). Both of these concepts are necessary for an implicit auction approach.

The BritNed section of this paper provides an example of an HVDC interconnection where it appears that the operators are trying to maximize the opportunity for every possible MW of interconnection capacity. This flexibility includes changes to the hourly schedules intraday as well as simultaneous import/export transactions. Given



the similarities with the Georgia-Turkey interconnection (HVDC, two country transmission system operator and market operator coordination), it seems that the Georgia-Turkey interconnection could have similar flexibility if rules and procedures are in place to permit these activities.

While recognizing that the Interconnection Operation Agreement (“IOA”) between GSE and TEIAS is not yet executed and that operating procedures to be agreed upon may provide additional transaction flexibility, the current version of the IOA seems to be somewhat limiting in transaction flexibility.

For example, we understand that the interpretation of the IOA is that in a given month, export transactions are only permitted from the “exporting country” as determined for that month on a yearly basis between GSE and TEIAS. It is not hard to foresee circumstances when export direction can change during a month due to weather conditions, hydrology conditions, market conditions, etc. A more flexible approach may be beneficial to exporters on both sides of the interconnection.

Further, it may be that there is limited flexibility for changing hourly schedules. The scheduling provision of the IOA states:

Power/Energy Export/Import Schedule: Exporting Party shall provide one week before the beginning of every Gregorian calendar month the quantity(ies) of supply for power on hourly basis for the each day of a calendar month based on results of allocation of capacity in accordance with Article 4 (according to Central European Time UTC +1). The Importing Party shall confirm the supply of this quantity/quantities to the other Party before the beginning of new calendar month. For this purpose The Parties shall consider those amounts and duration of energy to be transferred/delivered as defined in the Sale/Purchase Contract(s).

Any change in the amount of the electricity to be transferred shall be announced by The Parties one day before to the other Party till 09:30 p.m. on an hourly basis and if it be acceptable to that Party it shall confirms the supply of the changed quantity till 10:30 p.m.

That is, hourly schedules are to be provided one week before the start of the month and can only be changed if TEIAS (in the case of Georgian exports) approves. The criterion for approval or denial is not specified. It seems that a more flexible operating procedure would recognize that day-ahead schedule changes will take place routinely (particularly due to the inherent characteristics of run of river hydro) and such changes would be permitted subject to ATC constraints.

Finally, there is not currently a provision for simultaneous imports and exports of electricity. It is very possible that an exporter in Georgia may have a monthly contract to export while on a given day a Turkish supplier may have an opportunity to export to Georgia. In such a case, the contractual provisions of both contracts can be satisfied, while the physical flow across the interconnection is the net of those import and export transactions. Presumably, there is economic value in permitting these simultaneous transactions.

## Work Towards Consensus

Market coupling and implicit auctions would require a consensus between the Georgian TSO and MO, TEIAS, and PMUM and the relevant ministries and regulators that there is merit in pursuing this approach. The European Energy Regulators published a useful outline of steps needed to identify the issues and actions that must be taken in order to implement an implicit auction<sup>10</sup>. Some of the general points of that outline follow:

- (a) Study the existing process for day-ahead allocation of cross border capacity in the region
  - a. Identify the potential for efficiency gains from the adoption of implicit auctions instead of explicit auctions;
  - b. Give, where possible, a quantitative background to the assessment of the superiority of implicit auctions in short term trading;
  - c. Detect capacity that has been left unused;
  - d. Analyze procedures for cross border transactions (auctions, nominations, Use it or Lose It/Use it or Sell it, ATC calculations, time constraints;
  - e. Develop simulated examples to show the impact on social welfare.
- (b) Assess the differences in market designs in the region and identify coordination requirements
  - a. Overview trading arrangements and features of products traded;
  - b. Description of auction rules and algorithms;
  - c. Timing;
  - d. Guarantees and settlement;
  - e. Governance, institutional and regulatory framework, stakeholders
  - f. Monitoring and transparency rules;
  - g. Market liquidity;
- (c) Assess the features of other European implicit auctions
  - a. Compare the features of implicit auction mechanisms for congestion management that are in place or being developed in other European regions;
  - b. Identify coherent and divergent issues with other regional implicit auctions.
- (d) Preliminary feasibility study
  - a. Develop feasible implicit auction model;
  - b. Keep other parties informed on the design phase and the development of the implementation process.

---

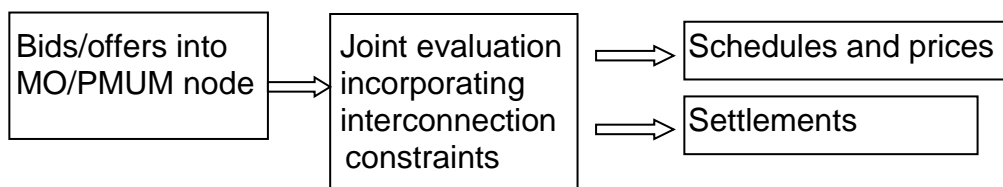
<sup>10</sup> "Action plan covering 2008 activities for the implementation of day-ahead implicit auction (market coupling / market splitting / dome coupling) in Central-South Europe as a mean to allocate cross border capacity" Final version 1404/2008

- (e) Develop proposal for MOU with timetable for detailed design and implementation

Based on the outcome of the steps above, as customized for the Georgia – Turkey interconnection, the process would be useful to reach consensus on the merits of implicit auctions.

#### Coordination/cooperation between MO and PMUM

PMUM is the market operator in Turkey. MO, currently ESCO, is the market operator in Georgia. Significant coordination and cooperation is required for an implicit auction and market coupling. This can be illustrated by the major difference between individual country day-ahead markets with explicit interconnection auctions as compare to implicit auctions. Note that the “MO/PMUM node” refers to a physical delivery and pricing point on the electrical border between Georgia and Turkey.



Clearly, the bid evaluation process, scheduling, prices, and settlements requirements require a well-coordinated process involving both the MO and PMUM. If we consider typical market operator roles such as user transaction interface, matching of bids and offers, settlement and credit, market participation information, there is the need to have a single source of market operator responsibility while considering the needs of each country.

In the BritNed example described earlier and in other European implicit auctions, the parties contracted with a third party to administer the auctions and provide many of the market operator functions. While not pre-judging the outcome of discussions between the Georgian MO and PMUM, it seems to be worth considering a similar approach for the Georgia-Turkey implementation.

#### Interconnection Capacity Allocation for Day-Ahead Market

The initial nomination of yearly and monthly interconnection capacity rights does not change with implicit auctions in the day-ahead market. Nor does publication of daily ATC. The change comes in that the explicit interconnection capacity auction is no longer required with implicit auctions. Instead, the day-ahead auction now incorporates an evaluation of bids and offers in both markets to the MO/PMUM physical delivery/ pricing node on the Georgia-Turkish interconnection that reflect both energy and interconnection capacity.

While not necessarily related to implicit auctions in the day-ahead market, the need for Georgian TSO-TEIAS coordination becomes significantly greater if Georgia and Turkey introduce intraday scheduling flexibility for the interconnection. It seems that this would add value in maximizing the use of the interconnection. This would

generate additional transmission and auction revenue to offset part of the interconnection costs as well as provide additional transaction opportunities for exporters and importers. While this would likely be useful to all exporters, the unpredictable characteristics of run of river hydro projects make intraday scheduling flexibility particularly useful. The clearest example is a rain storm that makes additional energy available to the market. It seems that a discussion of intraday scheduling flexibility on the interconnection (initially through explicit auctions as with BritNed) would be worthwhile.

#### Day-Ahead Schedule, Clearing and Settlements

In many respects, day-ahead schedules, clearing and settlements are identical in an implicit auction and in an energy-only auction. The differences of note are:

- (a) It is possible that there will be partially offsetting flows in both directions across the interconnection.

An example of this outcome is if a Georgian exporter is awarded interconnection capacity as a result of its bid in the implicit auction in the direction of Georgia-Turkey (e.g. 100 MW) and a Turkish exporter is awarded interconnection capacity as a result of its bid in the same auction in the opposite direction (e.g. 30 MW). In this case, each exporter can fulfill its contractual obligation, but the physical flow is the net of the offsetting transactions (70 MW in the direction of Georgia-Turkey in this example).

- (b) The process for scheduling across the interconnection needs to incorporate the results of the implicit auction.

In contrast to an explicit auction that gives a winning bidder the right to use interconnection capacity but not the obligation to schedule an actual transaction, winning an implicit auction obligates an exporter to schedule the transaction across the interconnection. Additionally, the TSO and TEIAS will need to coordinate so that the net flow as described above flows across the interconnection in the event of transactions in opposite directions.

- (c) Clearing and settlement of the markets in both countries are combined (since there is only one implicit auction) and so a third party or whichever country administers the auction would need to provide the clearing and settlement process.

### **11.0 RECOMMENDED STEPS**

While an implicit auction approach is not feasible until a day-ahead market is in place in Georgia, steps can be taken to research and develop consensus on the approach in preparation.

#### Introduce the proposed project to the Georgian Working Group

The MO Working Group provides a forum for discussion of the merits of market coupling. One advantage of the early introduction of the concept is to consider

market coupling in the context of the Electricity Trading Mechanism (“ETM”). In particular, if market coupling is viewed as a desirable element in the future, the design and implementation of ETM can incorporate the concept as a component of the program. This could lead to a more effective design and implementation program.

#### Meet with PMUM to discuss opportunity/challenges

Turkish acceptance of the market coupling concept and cooperation in its design implementation is of course a necessary condition of moving forward with market coupling. While Turkey does not yet have market coupling arrangements with Greece or Bulgaria, PMUM and TEIAS would be knowledgeable of the concept and the move towards market coupling throughout Europe. This would give Turkish stakeholders the opportunity to implement market coupling in preparation for similar arrangements with its ties into Europe.

#### Meet with EEC to discuss the opportunity

The European Energy Community (EEC) and European regulators have been strong drivers in the spread of market coupling throughout Europe. It would be very useful to fully involve European representatives in the discussion of market coupling between Georgia and Turkey.

#### Establish international working group (Georgia, Turkey, European representatives including traders)

Once the market concept is generally agreed upon within Georgia and Turkey, an international working group would provide a good forum to move from the conceptual level to the beginning of the design project. This would provide an opportunity to learn from those involved in market coupling integration the lessons in what has worked and what has proven to be problematic. Additionally, the working group would provide a forum to further the cooperative working relationship with Turkey which would be essential for project success.

#### Research and document the process followed to create the European market couplings

Much can be learned from the experience of European countries that have implemented market coupling. A report that investigates and documents the process followed to create European market couplings can form a roadmap for development of the Georgian – Turkey application.

#### Develop a detailed plan for creating the MO-PMUM node

Once the basic research is complete, a well-developed work plan is essential to reaching consensus on the approach and for successful implementation of market coupling.

#### Reach consensus on the plan

In order to move forward to implementation, consensus between stakeholders in Georgia, Turkey, and international donors, if applicable, would be required. The international working group will be an ongoing forum for discussion of the plan and so all parties should be moving in the same direction if the process is successful.

**USAID Hydropower Investment Promotion Project (USAID-HIPP)**

**Deloitte Consulting Overseas Projects - HIPP**

**Suite 5,13<sup>th</sup> floor, 11 Apakidze Street, Tiflis Business Center,**

**Tbilisi 0171, Georgia**